

Low Energy Neutral Atoms in the Magnetosphere

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We report observations of low energy neutral atoms from both the solar wind and the terrestrial ionosphere, obtained by the Low Energy Neutral Atom Imager on the IMAGE spacecraft. The LENA Imager detects and images fast neutral atoms arriving at the spacecraft from within a 90 deg field of view, swept through 360 deg by spacecraft spin with a 2 min period. Arriving neutrals are converted by reflection from a solid surface to negative ions. These are coarsely separated in energy (10 - 250 eV in the mode used most to date) and arrival direction (+/- 45 deg). They are then accelerated and detected as they pass through a thin foil and strike an image plane detector. Time-Of-Flight measurement between foil and detector yields the ion mass. We find that the both the solar wind and the ionosphere emit fluxes that routinely exceed our sensitivity level. Fluxes from the sun are observed to be modulated in response to solar wind variations, as are ionospheric outflow fluxes. Several periods of high geomagnetic activity have been observed, most produced by coronal mass ejecta. The largest fluxes are observed from the polar auroral regions during perigee passes over the southern pole. The range of LENA observations during the first few months of IMAGE operations are described and summarized.